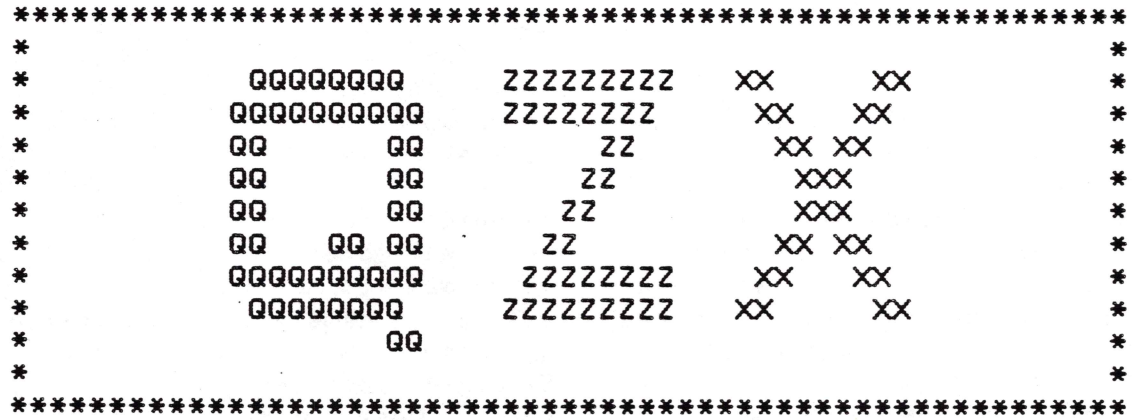
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The Journal Covering Amateur Radio & Sinclair Computers
ZX80; Micro-Ace; ZX81; TS1000, 1500, & 2068; QL; Z88
Alex. F. Burr, K5XY, Publisher
2025 O'Donnell Drive
Las Cruces, New Mexico
88001

Volume 7 Number 5 ($1.50 / issue) 1989 April

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EDITOR'S NOTES
K5XY

I guess QZX cannot stand prosperity or at least a publishing deadline cushion. Maybe it is that I procrastinate. Actually it is that the inside of our house got painted, an operation which required that everything be diassembled and moved twice, including the computer on which QZX is produced. Fortunately, this summer I do not go overseas, so maybe I can beat the publishing date back up to near the beginning of the month. At least QZX got printed in the appropriate month for the Mouse article.

Some will have noticed that the new QL IBM emulator program can be had with MSDOS 4.0. I have just received notice that John Wiley, publishers, have come out with a book explaining the nature of MSDOS 4.0 and with a reference book on that operating system. The first book is entitled The New DOS 4.0. It will be briefly reviewed next month.

Finally one of our Canadian subsribers has taken me up on the offer of a Canadian dollar. By the time you read this I will no longer have that dollar hidden under the cash box beside my desk. The Canadian stamps will be gone too.

Ralph Vasko said that the last issue of QZX got to the east coast in only two days. That is half the time it took his renewal letter to get here. Things have probably speeded up a bit since we went to first class mail, but I cannot complain about the mail service as it is fashionable to do. We have had very few complaints from anybody about missing issues (except for LU8MAD, who gets only intermittent service).

There are lots of good articles coming up. There are more contributions from LU8MAD and WA6DLI. There will be instructions on how to get the Z88 on packet, and a series on the inner workings of the Sinclair Logic Chip in the TS1000 type computers. This series is by Donald Lamen and will be based on the remarkable articles that he had published in the SINCUS newsletter. A lot of work has gone into this technical series, which should be very enlightening. I am very glad that QZX was mentioned in the April QST as a newsletter supporting an orphaned computer. Although new Sinclair computers are still being sold, most models are indeed orphaned. In any case the mention was very helpful as I received two inquiries a few days after I received my QST and many since then. Not many have been converted into subscriptions though.

UNCLASSIFIED ADS

WANTED: UNCLASSIFIED ADS for publication in QZX. Cost is 1 cent for each keystroke (characters, blanks, etc.). Payment must be included with order. This is an excellent way to sell your program or unwanted equipment, ask for help, or find a specific program. Send your ad with payment to QZX, 2025 O'Donnell, Las Cruces, NM 88001.

WANTED: Appendix E,F,G of ZX99 tape control system users manual data-cassette. Edward L. Radtke, 1602 Woodluck Ave., Louisville, KY 40205.

FOR SALE: Book Easy-up Antennas for Radio Listeners and Hams by Edward Noll. Paperback (1988) 162 pages. Originally $16.95, now $11.00 postpaid in the US. A Sams publication. The title says it all. Alex. F. Burr, K5XY, 2025 O'Donnell, Las Cruces, NM 88001.

QZX Discount: 15% discount on all orders mentioning QZX. T & C Services (address in ad in this issue).

BUILD A MOUSE

FULL COMPATIBLE WITH TS-1000, 1500, 2068, QL & Z88

LU8MAD

AS MOST READERS ARE AWARE, THE "MOUSE" IS A POPULAR EASY-TO-USE DEVICE FOR IMPUTING DATA TO COMPUTER.

SOME YEARS AGO, I HAVE READ A USEFUL ARTICLE BY ROBERT MARTIN KB2KTG IN REFERENCE TO A LOW COST MOUSE. AS THAT MOUSE IS FULLY COMPATIBLE WITH OURS COMPUTERS I BELIEVE VERY IMPORTANT TO MENTION HERE SOME PARAGRAPHS OF KB2KTG ARTICLE.

ACCORDING TO MARTIN "HAVING RECENTLY PURCHASED A VIC-20, AND UNWILLING TO SPEND SEVERAL THOUSAND OF DOLLARS TO GET A NEW MOUSE-EQUIPPED COMPUTER, I DECIDED TO BUILD A MOUSE WICH COULD BE USED TO UPGRADE MY PRESENT SYSTEM"

"TO BEGIN THIS PROJECT I DECIDED ON THE OBJECTIVES OF THE DESING. FIRST, MY MOUSE SHOULD BE A "HARDWARE-ONLY" DESING. I DON'T ENJOY PROGRAMMING AND, BESIDES, IT WILL BE MORE OF A CHALLENGE THIS WAY."

"SECOND, IF I DO UPGRADE MY HARDWARE AT SOME TIME IN THE FUTURE, I DON'T WANT THE MOUSE TO BE INCOMPATIBLE WITH WHATEVER IT IS BUY."

"THE MOUSE SHALL BE USABLE WITH ALL COMPUTER SYSTEMS IN EXISTENCE OR PLANNED."

"THIRD, THE DESIGN SHOULD BE SIMPLE ENOUGH THAT ANYONE COULD MAKE. A DUPLICATEIN ONE EVENING'S TIME. AND FOURTH, IT SHOULD NOT BE EXPENSIVE."

"AS YOU WILL SOON SEE, THEE OBJECTIVES LIMIT THE PERFORMANCE OF THE FINAL PRODUCT, BUT WE DO PRODUCE A MOUSE."

MARTIN CONTINUES: "NOT WISHING TO BE INCONVENIENCED BY THE CARE AND FEEDING OF A LIVE MOUSE, I DECIDED TO START WITH THE NEXT BEST THING."

"A RUBBER MOUSE FROM THE LOCAL PET STORE LOOKET GREAT. THE MOUSE I BOUGHT COST LESS THAN TWO DOLLARS. AS AN ADDED BONUS, MY MOUSE WAS AVAILABLE IN SEVERAL COLORS."

"A QUICK INCISION ON THE MOUSE'S LOWER ABDOMEN (NO ANESTHETIC NECESSARY) WITH MY TRUSTY SWISS ARMY KNIFE AND A CONTROL PORT WAS AVAILABLE FOR INTERCONNECTION CABLE INSERTION."

"I USED A TELEPHONE EXTENSION CORD WITH MODULAR END CONNECTORS. THE CONNECTORS KEEPS THE CABLE FROM PULLING OUT OF THE CONTROL PORT."

"THE OTHER END OF THE CABLE IS SECURED TO THE COMPUTER WITH A SUITABLE LEMGTH OF MASKING TAPE. THE ASSEMBLY AND CHECKOUT ARE NOW COMPLETE."

AND AFTER SAID IN REFERENCE TO OPERATING HINTS AND SUGGESTIONS: "THE MOUSE, USED IN CONJUNCTION WITH THE INTENSITY CONTROL ON THE MONITOR, IS USEFUL FOR VARYING THE BRIGHTNESS OF THE VIDEO DISPLAY."

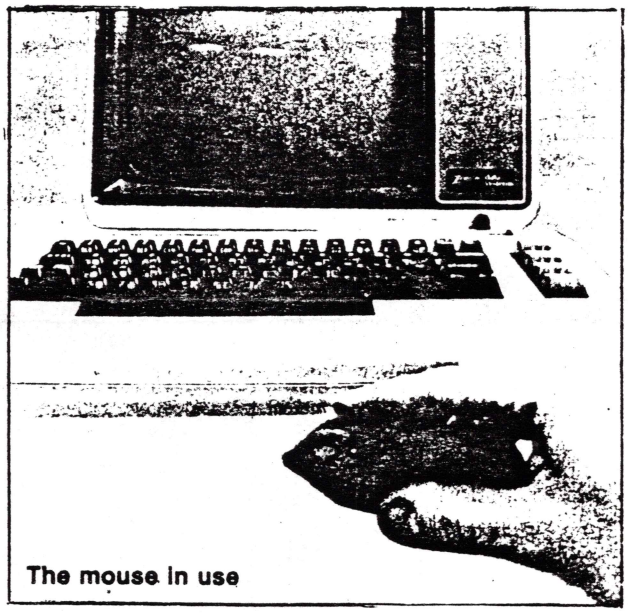
"A LITTLE EXPERIMENTATION WITH THE MOUSE WILL QUICLY DEMOSTRATE ITS OTHER CAPABILITIES."

"SOME METHOD WAS NEEDED TO HOLD THE MOUSE BETWEEN OPERATING SESSIONS. WHILE CHATTING WITH THE MANAGER OF OUR LOCAL HARDWARE STORE, I MENTIONED THE PROJECT AND MY NEED."

"HE SUGGESTED SOMETHING WHICH APPEARS TO BE ALMOST DESIGNED FOR THE JOB. HE CALLED IT A "TRAP". THAT SEEMS TO BE AS GOOD A NAME AS ANY. THE TRAP CAN BE FASTENED TO THE MONITOR, THE WALL, OR EVEN TO YOUR COMPUTER TABLE."

MARTIN ENDING: "I HOPE YOU WILL HAVE AS MUCH FUN BUILDING AND USING THE MOUSE AS I DID. AFTER THE NOVELTY WEARS OFF, IT CAN ALWAYS BE USED AS A DECOY FOR YOUR NEXT MOUSE HUNT!"

ABSTRACT OF:
"A LOW COST MOUSE", BY ROBERT MARTIN WB2KTG
MICRO, No 71, APRIL-MAY 1984



The mouse in use

Figure 1.

Figure 2.

Mouse and mouseholder, sometimes called "trap."

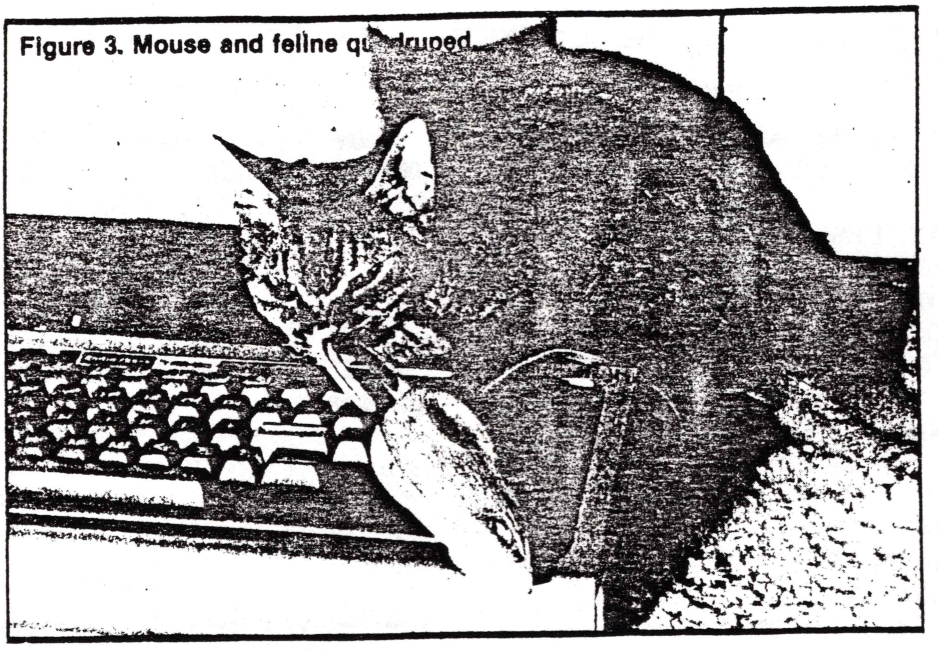
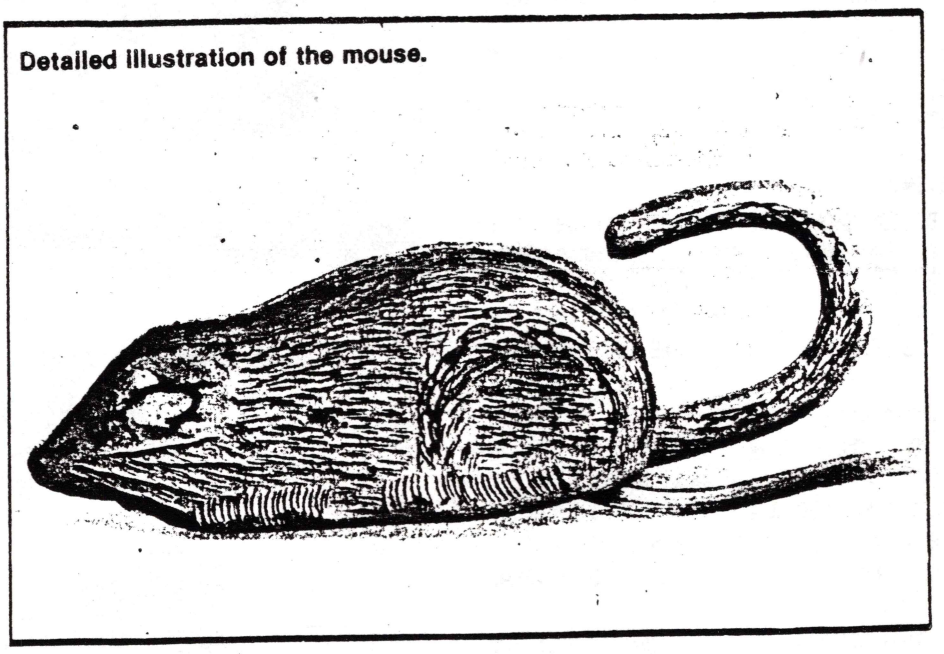


Figure 3. Mouse and feline quadruped.



Detailed illustration of the mouse.

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(The following from SARUG England translation to Spectrum/2068 of TF3XUU program for Meteor-Scatter Contact Efficiency by G4INP!) This version typed for QZX by Bob WA6DLI..fun if you can use it!

A long-distance meteor-scatter contact should be planned well in advance if it is to be successful. The maximum reflection time is given when the radiant of the shower is rectangular to the line between both stations under 45 degree elevation. This program calculates the radiant-position and efficiency.

After the date input, right-ascention and delination and locator (in either WW or European format), the distance between the stations is calculated in km with the azimuth and elevation. The table shows hourly values for the azimuth and elevation of the radiant, together with the efficiencies for the four main directions plus that for the DX station.

The example table shows the results for the Lyrids on 22 April 1986; not many reflections can be expected between 1300 and 1800 because the radiant is below the horizon. North-South contacts will be the most effective form 0500-1000 and 21200-0200.

Insert your latitude BE and longitude LE in line 20. Locations West of Greenwich & South of the Equator are entered NEGATIVE (-).

PROGRAM OF TF3XUU

```
10  POKE 23658,8: DIM A(40): LET K1=180/PI: LET K2=PI/180: LET
     H=100: REM POKE FORCES CAPS
20  LET LE=-118.0: LET BE=34.1: LET BE=BE*K2
30  FOR I=1 TO 40: READ A(1): NEXT I
40  INPUT "DAY NO. (DD) ";D;" MONTH (MM) ";M;" YEAR (YYYY) ";J
50  INPUT "RIGHT ASCENSION ";RA
60  INPUT "DECLINATION ";DE: LET DE=DE*K2
70  INPUT "WW/EU-LOC OF DX STATION ';A$
80  IF LEN (A$)=6 THEN GO TO 70
90  IF LEN (A$)<>5 THEN GO TO 70
100 REM  LETTER OH IN 110
110 LET O=CODE A$(1)-65: LET P=CODE A$(2)-64
120 LET Q=VAL A$(3): LET R=VAL A$(4): LET S=CODE A$(5)-64: IF
    O>21 THEN LET O=O-26 :REM LETTER OH IN THIS LINE
130 IF P>23 THEN LET P=P-26
140 IF R=0 THEN LET R=10: LET Q=Q-1 :REM ZERO IN THIS LINE
150 LET LG=((2*O)+(R/5)+(A(S+20)/24)-1/48): REM OH IN LINE
160 LET BG=K2*(40+P-(Q/8)-(A(S+30)/24-1/48)
170 GO TO 210
180 REM
190 LET LG=(CODE A$(1)-65)*20-180+VAL A$(3)*2+CODE(A$(5)-65)/12+
    1/24
200 LET BG=K2*(CODE A$(2)-65)*10-90+VAL A$(4)+(CODE A$(6)-65)/24+
    1/48
210 LET DX=COS ((LG-LE)*K2)*COS (BG)*COS (BE)+SIN (BG)*SIN (BE)
220 LET DX=-ATN (DX/SQR (1-DX^2))+PI/2: LET DX=DX*6371
230 LET BN=SIN ((LG-LE)*K2)
240 LET CN=TAN (BG)*COS (BE)-SIN (BE)*COS ((LG-LE)*K2)
250 LET AN=ATN (BN/CN)
260 IF CN <= 0 THEN LET AN=AN+PI: REM ZERO IN LINE 260
270 IF CN > 0 AND AN < 0 THEN LET AN=AN+2*PI
280 LET EL=ATN (2*H/DX)*K1-(0.001*DX)^2: IF EL < 0 THEN LET EL=0
290 LET DX=INT (DX+0.5): LET AZ=INT (AN*K1+0.5):
```

```
295 LET EL=INT(EL+0.5)
300 PRINT "QRB = ";DX;" QTF = ";AZ;" EL = ";EL
310 PRINT "GMT AZ EL ";
320 PRINT "NESW EW NWSE NS ";A$( TO 5)
330 LET D=A(M)+D
340 IF J/4 <> INT (J/4) THEN GO TO 380
350 IF J/400=INT (J/400) THEN GO TO 370
360 IF J/100=INT (J/100) THEN GO TO 380
370 IF M >= 3 THEN LET D=D+1
380 LET X=(J-1982)/4: LET Y=(X-INT (X))*4
390 LET X=INT (X)*0.002052
400 LET C=A(Y+13)+X
410 FOR T=0 TO 24
420 LET T$=STR$ (T): IF LEN (T$) <> 2 THEN LET T$=" "+T$
430 LET B=BE: LET L=LE: GO SUB 610
440 PRINT T$;TAB (3);
450 LET Q$=STR$ INT (AZ*K1+0.5): LET R$=STR$ INT (EL*K1+0.5)
460 IF LEN (Q$) <> 3 THEN LET Q$=" "+Q$: GO TO 460
470 IF LEN (R$) <> 3 THEN LET R$=" "+R$: GO TO 470
480 PRINT Q$;TAB (7);R$;
490 LET E=SIN (EL)*COS (EL)
500 FOR N=17 TO 21
510 IN N < 21 THEN LET NA=A(N)*K2: GO TO 530
520 LET L=LE+(LG-LE)/2: LET B=BE+(BG-BE)/2: LET NA=AN:GO SUB 610
530 IF E < 0 THEN LET EF=E*ABS (COS (NA-AZ)): GO TO 550
540 LET EF=E*ABS (SIN (NA-AZ))
550 LET E$=STR$ INT (EF*200+0.5)
560 IF LEN (E$) <> 3 THEN LET E$=" "+E$: GO TO 560
570 PRINT " ";E$;
580 NEXT N: PRINT
590 NEXT T
600 GO TO 40
610 LET SZ=C+1.0027379*T+0.06570982*D+L/15
620 IF SZ > 24 THEN LET SZ=SZ-24: GO TO 620
630 LET SW=SZ*15-RA: LET SW=SW*K2
640 LET EL=ASN (SIN (B)*SIN (DE)+COS (B)*COS (DE)*COS (SW))
650 LET SA=COS (DE)*SIN (SW)/COS (EL)
660 LET CA=(SIN (B)*COS (DE)*COS (SW)-COS (B)*SIN (DE))/COS (EL)
670 LET AZ=ATN (SA/CA)
680 IF AZ < 0 THEN LET AZ=AZ+PI
690 IF SA > 0 THEN LET AZ=AZ+PI
700 RETURN
710 DATA 0,31,59,90,120,151,181,212,243,273,304,334
720 DATA 6.622408,6.606493,6.590579,6.640374
730 DATA 45,90,135,180
740 DATA 1,2,2,2,1,0,0,0,1,1,0,0,1,2,2,2,1,0,1,1
```

Here is a solution to test your program:
Input data is DD MM YYYY = 22 4 1986

RA is 272, DEC is 33 Locator is HU46D
QRB = 1367 QTF = 10" EL = 6

GMT	AZ	EL	NESW	EW	NWSE	NS	HU46D
0	93	49	73	4	67	99	99
1	106	59	77	24	43	85	84
2	126	68	69	41	11	56	54
3	161	74	48	50	23	18	18
GMT	AZ	EL	NESW	EW	NWSE	NS	HU46D
4	206	73	17	49	52	25	14

QL DATA INTERFACE 2

K5XY

This article is a continuation of the article, QL Data Interface 1, from last month about the Prairie Digital Data Acquisition System for the QL. The article last month told something about the system in general and described the digital I/O ports and the A to D converters which are the basis of the system.

This month the article will be more specific and give some details of the circuit board and the circuit itself.

The circuit board is a well constructed glass epoxy, double sided circuit board with plated through holes. It is well designed with no messy last minute corrections hand wired into it. Attention has been paid to the design of the copper traces with those carrying the greatest amount of current, such as the V+ and the ground leads, considerably wider than the leads which do not transport as much.

The card itself is about 3.8 inches (96 mm) wide by 3.4 inches (87 mm) long. At one end there is a 64 pin jack that mates with the corresponding plug inside the peripheral port on the left side of the QL. You take off the shielded cover on the port and have just room to insert the data acquisition card. Gentle pressure and a little wiggling will seat it nicely. About 1 cm of card sticks out of the port. This part of the card has 64 pads to which you could solder a right angle 64 pin connector. You could also solder wires directly to the pads. There are so many possible external connections to the data acquisition card that only 11 of these 64 traces are unused. If you are to use many of these, a connector almost surely must be added.

The most noticable components of the board are the eight integrated circuits. They are all (except for the voltage regulator) installed in sockets. There are a goodly number of resistors, a few bypass capacitors, and one lonely transistor (a 2N2222).

The largest integrated circuit is an 8255A PPI chip. The PPI stands for programable peripheral interface, and that is just what it is. Under the control of the QL, this chip will accept signals from the outside world or provide signals to equipment connected to the board.

The most important but smallest intergrated circuit on the board is the Texas Instruments TLC5491P. This chip is an eight bit serial analog to digital converter. The timing and control pulses necessary for the conversion come from the PPI. The serial output from the converter is routed to the QL through the PPI.

There is just one analog input to the converter, but the board promises eight channels of A to D conversion. This multiplication of input channels is performed by a 4051 multiplexor. This chip has eight analog input lines and one output line. Various input lines are connected to the output line depending on the state of three control lines. These lines can be connected to the PPI for control from the QL or to the output connector for control from the external world. If nothing is done with these lines, the analog signal from channel zero (Yo) is the active analog channel and the multiplexor can be ignored.

There are three TTL integrated circuits on the board, one set of NAND gates, and two sets of OR gates. These gates are used to decode signals from the QL in order to drive the PPI.

One of the remaining intergated circuits is a 4040 ripple counter. It is permanently connected to nothing else. It is used as a general purpose counter or timer.

The remaining integrated circuit is a 317 programable voltage regulator. In some respects this is the most critical component on the whole board. The output of the regulator reduces a voltage from the QL to five volts to operate the IC's on the board. But, more importantly, it provides the essential standard voltage against which the analog voltage to be measured is compared. Any error in this voltage is transferred to the result. The accuracy of this standard depends on the ratio of the two voltage setting resistors attached to the 317 regulator. In keeping with the importance of these components, they are special high precision resistors.

Figure 1 is an outline of the board showing the placement of the integrated circuits.

The procedures used to establish the standard voltage is one of the weaknesses of this board. Other boards use special standard voltage integrated circuits to establish a voltage which is used only as a standard. The 317 regulator is not especially designed for precision or stability. Furthermore, its output is used to power the board as well as establish the voltage standard. This weakness is not serious considering the uses to which the board will be put. The designers could easily have provided more advanced circuitry, but only at the expense of increased cost. At $90 this board is cost effective. Other stripped down boards on the market cost around $300 and inexpensive industrial boards cost on the order of $1000.

Next month I will describe some actual measurements taken with the board.

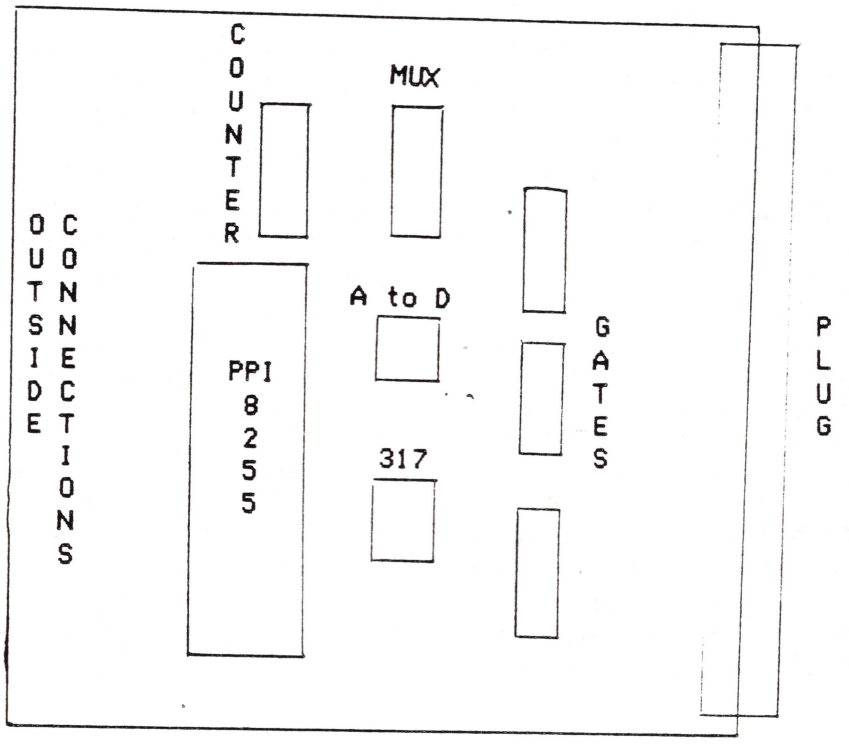

Fig. 1 Layout of Data Acqusition Board

QZX FRIENDS

WA2BSS -- Stuart wrote to say that he is enjoying QZX again. I am not quite sure how to take that comment, but at least he extended his subscription.

WB0QPI -- Lloyd renewed too. He did not want to cut his last issue for the renewal form so he drew a real fancy one on a 3 X 5 card. It is not necessary to do that; just send along your call so I can find your records in my data base.

KQ2F -- Bob renewed and wrote a bit about his collection of software for the TS1000, 1500, adn 2068. He thinks it might be one of the largest collections existing. He is considering contributing it to SNUG when they get their procedures established. See also his ad in the March '88 QZX.

W8FXZ -- Dick renewed and said that QZX is one of his favorite publications.

WB3AIT -- Ed renewed although he said that his new electronic business almost keeps him too busy to use his computers.

WA6OJJ -- Bob renewed after an absence of several years. His TS1000 is still going strong on packet. (See the December 1988 issue.) His TS2068 is set up with Oldger interface and dual 3" Amdon drives.

W2SJU -- George uses his ZX81 to provide an ID of his call sign for his ATV station on 439.25 MHz. Not only is the ID readily visible, but he has a banner that runs through the bottom which can be readily changed.

THIS QL DATA ACQUISITION SYSTEM FEATURES:

24 LINES OF PROGRAMMABLE I/O
8 CHANNEL - 8 BIT A/D CONVERTER
12 BIT COUNTER
PLUGS INTO THE EXPANSION CONNECTOR
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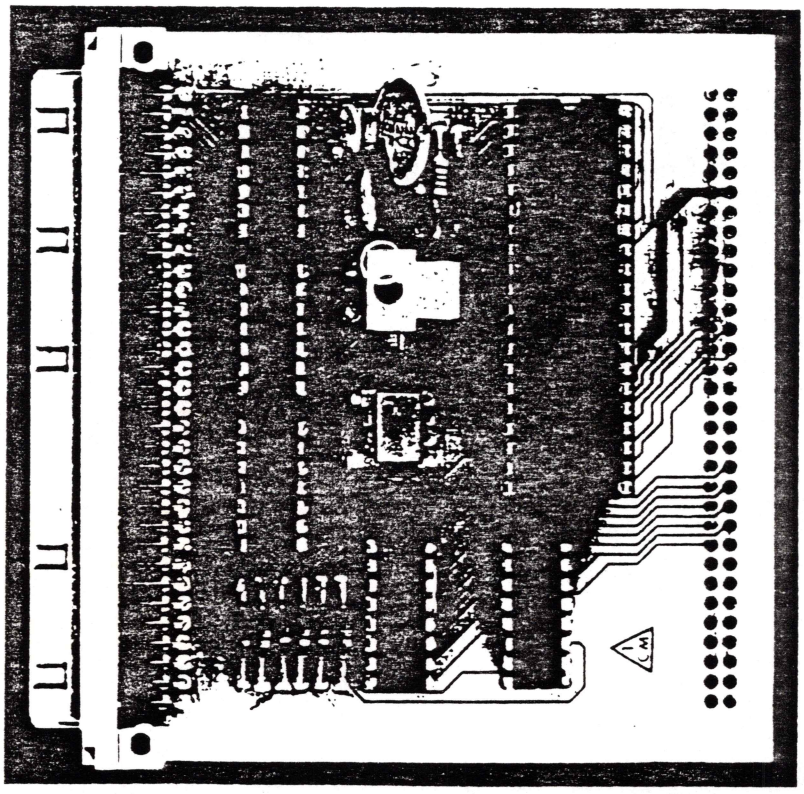

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1 SYSTEM	$89.00	U.S. DOLLARS
2 TO 4	$79.00	"
5 OR MORE	$75.00	"

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Bare board order includes complete instructions.

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73, K5XY

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